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CARIBBEAN CORAL REEFS

Lettuce corals overgrowing tube sponges at St. Eustatius, Dutch Caribbean

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Abstract Sponges and corals are well-known competitors for space on coral reefs. Only a few documented observations are known of sponge-coral interactions in which the latter dominate the former. In the Caribbean, reef-dwelling sponges are generally abundant and have a reputation of being aggressive competitors for space. The present study is exceptional, because it reports on corals overgrowing sponges.

Keywords Competition for space · Coral reefs · Interspecific dominance · Sponge-coral interactions

Within Caribbean coral reef ecosystems, interactions between corals and sponges are well documented, usually with sponges outcompeting corals in direct competition for growth space (Aerts and Van Soest 1997). Some of these sponges are able to produce toxic compounds that may harm and kill scleractinian corals, as demonstrated in interactions between the liver sponge *Plakortis halichondrioides* (Wilson, 1902) and the lettuce coral *Agaricia lamarcki* (Milne Edwards and Haime, 1851) (Porter and Targett 1988). Other Caribbean sponges may harm corals by overgrowing them (Loh et al. 2015) or by excavating their skeleton (López-Victoria et al. 2006). Documented examples of sponges becoming partly or completely submissive to corals are exceptional. These are known, for instance, from the Indo-Pacific, involving fast-growing encrusting parts of foliaceous *Montipora corals* (Elliott et al. 2015) and free-living corals that have dropped and settled on phototrophic sponges (Hoeksema et al. 2014).

During a marine biodiversity survey at St. Eustatius (Lesser Antilles) in June 2015, a colony of *Agaricia agaricites* (Linnaeus, 1758) was found at 19 m depth overgrowing a brown tube sponge, *Agelas conifera* (Schmidt, 1870) (Fig. 1a). The sponge showed signs of tissue damage and settlement of red filamentous algae (Fig. 1b). This observation was unexpected, since *A. conifera* is regarded as a chemically defended sponge which is able to deter fish predation, inhibit growth of other sponges, and prevent fouling organisms from colonizing it (Assmann et al. 2004). This interaction was observed only once during the whole expedition (40 survey sites), whereas both species were found to be co-occurring at 21 sites. In addition, a sunray lettuce coral, *Helioseris cucullata* (Ellis and Solander, 1786), of the same family (Agariciidae) was found to overgrow

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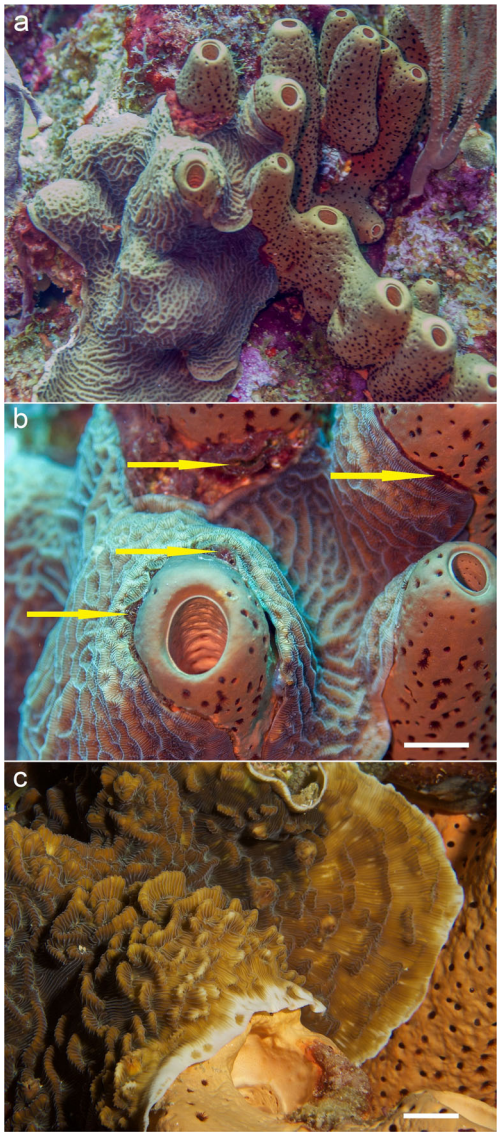

Fig. 1 Coral–sponge interactions at St. Eustatius: **a** *Agaricia agaricites* coral overgrowing part of a tube sponge, *Agelas conifera*; **b** same sponge showing tissue damage and algal settlement (*arrows*); **c** *Helioseris cucullata* coral partly overgrowing an *A. conifera* sponge. Scale bars: 1 cm

an *A. conifera* tube sponge, with both species reported as co-occurring at 11 sites (Fig. 1c).

The ability of agariciid corals to overgrow chemically defended sponges is worth pursuing. Additional field studies in other Caribbean reefs are needed to confirm whether such interactions are more common than presently assumed.

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